Hazard Summary (See specific Safety Data Sheets for more information)

Health Hazards: May be fatal if swallowed and enters airways. May cause genetic defects. May cause cancer. Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness.
Physical Hazards: Fire and explosive hazards. Heat Stress Hazards. Slip, Trip and Fall Hazards.

Signs and Symptoms of Exposure (See SDS for more information)

Short-term over-exposures to this material may cause irritation to skin and eyes, headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation.
Long term inhalation over-exposures to this material may cause cancer. Contains material that may cause heritable genetic damage. Contains material that may cause damage to the blood and blood forming organs.

Emergency Actions (See SDS for more information)

First-aid measures general: **If exposed or concerned: Get medical advice/attention.**
First-aid measures after inhalation: Remove to fresh air and keep in a position comfortable for breathing. In case of irregular breathing or respiratory arrest provide artificial respiration.
First-aid measures after skin contact: Wash immediately with water for 15 minutes. Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
First-aid measures after eye contact: Rinse immediately and thoroughly with water, hold eyelids open for 15 minutes.
First-aid measures after ingestion: Immediately call a POISON CONTROL CENTER and/or 911. Rinse mouth.

Air Monitoring/Sampling Equipment

Equipment (Linked to ERTG QSG)	Notes
MultiRAE Pro	PID only detects VOC's with an Ionization Potential (IP) <10.6; also H_2S, CO, $\%O_2$, and %LEL. See RAE Systems Technical Note TN-106 for information on PID use and correction factors.
TVA 1000	Non-specific, FID will detect total VOC's. PID will detect VOC's w/ an IP <10.6
Draeger Chip Management System (CMS)	Estimated 10% - 20% margin of error.
Draeger Tubes	Estimated 25% margin of error.
UltraRAE 3000	Use Benzene-specific separation tube for Benzene monitoring.
Personnel Sampling: 1. GilAir Sample Pump 2. SKC Sample Pump	Analytical methods: 1. Oil Mist - NIOSH 5026 2. Benzene – NIOSH 3700 3. VOC's – NIOSH 2549 4. Hydrocarbons – NIOSH 1500 Will also need a DryCal Calibrator and appropriate sampling media

Exposure Limits

Contaminant	IDLH[10]	OSHA Exposure Limits[10]	ACGIH Exposure Limits[12]	Explosive Range[10]	Ionization Potential[10]	PID Correction Factors[11]
Benzene	500ppm	TWA: 1 ppm, STEL: 5ppm	TWA: 0.5ppm, STEL: 2.5ppm	1.2-7.8%	9.24 eV	0.47
Butane	1600ppm (10%LEL)	--	STEL: 1000ppm	1.6-8.4%	10.63 eV	--
Carbon Monoxide	1200ppm	TWA: 35ppm, Ceiling: 200ppm	TWA: 25ppm	12.5-74%	--	--
Diesel Fuel	600ppm (10%LEL)	--	TWA: 100mg/m^3/~11ppm (total hydrocarbon vapor)	0.6-7.5%	Mixture	0.7
Ethyl Benzene	800ppm (10%LEL)	TWA: 100ppm	TWA: 20ppm	0.8-6.7%	8.76 eV	0.65
Gasoline	--	--	TWA: 300ppm, STEL: 500ppm	1.4-7.6%	Mixture	0.9-1.0
Hydrogen Sulfide	100ppm	Ceiling: 20ppm	TWA: 1ppm, STEL: 5ppm	4.0-44.0%	10.46 eV	3.3
Kerosene (Jet Fuel)	700ppm (10%LEL)	--	TWA: 200 mg/m^3/~29ppm (total hydrocarbon vapor)	0.7-5.0%	Mixture	0.6-1.0
Nitrogen Dioxide	20ppm	Ceiling: 5ppm	TWA: 0.2ppm	--	--	--

Contaminant	IDLH[10]	OSHA Exposure Limits[10]	ACGIH Exposure Limits[12]	Explosive Range[10]	Ionization Potential[10]	PID Correction Factors[11]
Oil Mist	2500 mg/m^3/~149ppm	TWA: 5 mg/m^3/~0.3ppm	--	--	Mixture	--
Pentane	1500ppm (10%LEL)	TWA: 1000ppm	1000ppm	1.5-7.8%	10.34 eV	8.4
Petroleum Distillates	1100ppm (10%LEL)	TWA: 500ppm	--	1.1-5.9%	Mixture	--
Sulfur Dioxide	100ppm	TWA: 5ppm	STEL: 0.25ppm	--	--	--
Toluene	500ppm	TWA: 200ppm, Ceiling: 300ppm	TWA: 20 ppm	1.1-7.1%	8.82 eV	0.45
Xylenes	900ppm (10%LEL)	TWA: 100ppm	TWA: 100ppm, STEL: 150ppm	0.9-7.0	8.44 – 8.56 eV	0.39-0.40

Action Levels:

Contaminant/Hazard	Action
Fire or Explosion Hazard Oxygen Deficient or Rich Atmosphere	**Leave the work zone and implement engineering controls. Engineering controls used in a potentially explosive atmosphere must be rated explosion proof.**
Exceed an OSHA or ACGIH Exposure Limit	Leave the work zone and implement engineering controls. Don Level C PPE. Replace cartridges at the end of each work shift and/or based on manufacturers recommendations. **Do not reenter the work zone if LEL levels are still >10%.**
Oxygen Deficient Atmosphere and/or Exceed the Maximum Use Concentration of Respirator	Leave the work zone and implement engineering controls. Don Level B PPE. **Do not reenter the work zone if LEL levels are still >10%.**

Personal Protection Equipment

Level D:	Safety Toe/Shank Work Boots, Safety Glasses, Flame Resistant Coveralls (as needed), Work Gloves (as needed), Hard Hat (as needed), High-Vis Vest (as needed), Hearing Protection (as needed), personal flotation device (as needed), Chest waders (as needed)
Level C:	Safety Toe/Shank Work Boots or HAZMAT Boots, Appropriate Chemical Protective Suit, Flame Resistant Coveralls (as needed), Full Face APR with Appropriate Cartridges, Appropriate Chemical Protective Gloves, Work Gloves (as needed), Hard Hat (as needed), High-Vis Vest (as needed), Hearing Protection (as needed)
Level B:	Safety Toe/Shank Boots or HAZMAT Boots, Appropriate Chemical Protective Suit, Flame Resistant Coveralls (as needed), and Chemical Protective Gloves, SCBA, Work Gloves (as needed), Hard Hat (as needed), Hearing Protection (as needed)

NOTE: Always review the PPE permeation rates for the specific compounds involved. Saranex (Tychem SL), Polyethylene Coated Suits (Tychem QC) and Nitrile Gloves may not always be appropriate for petroleum responses. The following are permeation rates for equipment carried by ERRPB. Always confirm this information with SDS or Specific Manufacturer
Permeation Rates are in Minutes, unless otherwise noted.
imm.: Chemical moves through suit, glove or boot material immediately. Blank Cells - No testing data available.

		Chemical Protective Suits					Chemical Protective Gloves					Boots	
		DuPont	DuPont	DuPont	DuPont	DuPont	North	Ansell	North	North	Ansell	Tingley	Onguard
Chemical Name	**Physical State**	**Tychem QC**	**Tychem SL - Saranex**	**Tychem BR**	**Tychem Responder**	**Tychem TK**	**Silver Shield**	**Barrier**	**Viton**	**Butyl**	**Solvex Nitrile**	**HAZPROOF**	**Boot Cover**
Crude oil	Liquid	imm.	>480	>480	>480	>480							
Diesel fuel	Liquid	imm.	48	>480	>480	>480							
Ethanol	Liquid		>480		>480		>480	>480		>480	240		Excellent
Fuel oil	Liquid	imm.	>480		>480								
Gasoline	Liquid		imm.	>480	>480	>480		170			>480		Poor
Kerosene and Jet Fuel	Liquid		58	>480	>480	>480		>480			>360		Poor

Decontamination

Dry removal of PPE following standard contamination control techniques is typically appropriate. Wash hands and face with soap and water after exiting the contaminate reduction zone. Use a degreasing solution to decontaminate waders, chemical protective boots, tools and equipment.

Special Considerations

- Light ends (e.g. pentanes, butanes, benzene, xylenes, toluene, and ethyl benzene) often volatilize during the first few days of the response as the oil weathers. **Do not underestimate the explosive hazards of the light ends.**
- Exposure to carcinogens should be as low as reasonably achievable. Implement engineering controls even if air monitoring indicates respiratory protection is not required.
- Additional health and safety considerations and controls are needed during In-situ Burning Operations. See SOG # P103 for additional information.

Resources/References:

1. OSHA Compendium of Oil Spill Safety Data Sheets (includes SDS's for dispersants and DECON agents)
2. Other SDS: Benzene, Ethyl Benzene, Toluene, Xylene
3. Emergency Response and Removal Operations Job Hazard Analysis
4. Emergency Response, Removal and Prevention Health and Safety Standard Operating Guidelines
5. Emergency Response, Removal and Prevention PPE Selection Guides
6. OSHA PPE Matrix for Oil Spill Response
7. NIOSH Respiratory Protection Recommendations – Deepwater Horizon Response
8. Emergency Response Air Monitoring Guidance Tables (EPA ERTG, 2012, Version 3)
9. Hazard Evaluation Flow Chart for Unknowns (EPA ERTG, 2005, Version 6)
10. NIOSH Pocket Guide to Chemical Hazards
11. RAE Systems Technical Note TN-106
12. American Conference of Governmental Industrial Hygienist TLVs and BEIs
13. SCOTT Safety SureLife Cartridge Calculator
14. MSA Emergency Response Application (Respirator Cartridge Calculator)